Working Paper Series

Globalization and Inequality: Where do we stand?

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ECINEQ WP 2012 – 279

ECINEQ 2012 – 279
November 2012

www.ecineq.org

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Where do we stand?

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Abstract

Over the last thirty years, both developed and developing countries have experienced a huge globalization of their economies, which has coincided with an increase in intra-country income inequality, both within and between skill groups. This article surveys the key mechanisms of the globalization-inequality relationship. Four strands of literature are reviewed. First, the extension of the North-South HOS approach by relaxing certain simplifying assumptions makes it possible to generate most of the observed facts on trade and inter-skill group inequality, but also between unequally talented workers. Second, production segmentation and offshoring reveal several factors that increase inequality, particularly in developing countries. Third, accounting for firm heterogeneity generates intra-skill group inequality. Fourth, globalization causes changes in technologies and in institutions that can foster inequality. The mechanisms by which globalization raises inequality are thus numerous. A large part of the reviewed literature combines globalization with technological or/and institutional changes, which reconciles the three major explanations that have been given to the observed rise in inequality.

Keywords: globalization, inequality, North-South trade, skill, top incomes.

JEL Classification: D3, E24, E25, F1, J31, O15.

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1. Introduction

Over the last thirty years, the world economy has experienced a rapid globalization process characterised by several developments:

1) An increasing number of developing countries (the South) have chosen to become open and to enter the globalized economy.

2) The weight of the South in the world production and exports of goods (particularly manufacturing) and services has critically increased.

3) In world trade, advanced countries (the North) are specialised in the exports of skill intensive goods whereas the South is specialised in unskilled-intensive ones. This is in line with the relative endowments of each area in terms of skilled/unskilled labour. In addition, the South did not export skill-intensive goods at the outset of the globalization process, and the North no longer produces and exports unskilled-intensive tradable goods.

4) Both physical (FDI) and financial capital have become extremely mobile across countries.

5) The expansion of multinational firms (MNFs) has rendered northern technologies open to emerging countries.

6) In contrast with capital and technology, labour mobility has remained limited because of migration costs, cultural gaps and anti-immigration policies.

This globalization dynamics has been concomitant with an increase in within-country inequality in both the North and the South.

Considering advanced economies, the rise in income inequality is well documented (Van Reenen, 2011, and Chusseau and Dumont, 2012, for recent descriptions). It concerns both between-skill and within-skill income inequality. In addition, if all developed economies have exhibited an increase in income inequality, this increase appears very uneven across countries, both in intensity and periodicity, and it has resulted in a clear divergence in inequality between advanced countries. Anglo-Saxon economies, particularly the US, have known the deeper and earlier increase. Nordic European economies have seen their inequality grow but this has occurred from a very low level, which makes them remain egalitarian compared to other countries. Finally, Continental Europe (Austria, Belgium, France, Germany) showed no significant increase in inequality until the early 2000s (with even a decrease in France). However, a reversal seems to have occurred in the 2000s and these countries now experience an upsurge in inequality, particularly Germany.

Considering emerging countries, Chusseau and Hellier (2012) report very different inequality profiles over time depending on the area (Asian NICs, China, India, Latin America) or country. However, the general diagnosis is that of an increase in inequality over the last thirty years (Goldberg and Pavcnik, 2007), even if we have indications of a possible reversal in the 2000s. In addition, the South has always displayed higher inequality than the North, despite the substantial inequality upsurge observed in northern countries.

Quite early, i.e. in the late eighties, the economic literature has put forward and analysed the possible links between, North-South trade and globalization on the one hand, and growing within-country income inequality on the other hand. In fact, in addition to the time coincidence of both phenomena, the traditional Heckscher-Ohlin-Samuelson (HOS) approach seemed to provide a straightforward explanation for the observed rise in inequality between skilled and unskilled workers in the North. However, the HOS model failed to explain, and its predictions were even at odds with, a large number of observed facts (Hellier, 2012a, for an extensive list of these contradictions). These shortcomings, as well as the early empirical studies that assessed the impact of trade (Borjas et al, 1992; Katz and Murphy, 1992; Krugman and Lawrence, 1993; Lawrence and Slaughter, 1993) led to the first diagnosis that North-South trade had little impact on growing inequality in the North, the explanation for which should be found in skill-biased technological progress and institutional changes (Krugman, 1994; Krugman and Lawrence, 1993). In the early nineties, Krugman explained this failure of North-South trade to provide a plausible explanation for inequality in the US by the negligible size of the South. However, following Wood's calculations (1994), a number of empirical studies have revisited the Trade-Inequality relationship and led to the new diagnosis that the impact of North-South trade was far from negligible (Chusseau et al., 2008 for a review). The newest literature that estimates a direct link between globalization and inequality confirms this diagnosis (Dreher et al., 2008; Kosteas, 2008; Epifani and Gancia, 2008). In addition, the huge increase in the weight of emerging countries in both world trade and world production renders the assumption of a low-sized South inadequate (Krugman, 2008).

As regards emerging countries, both the observed rise in inequality and the results of several empirical works showing a positive impact of trade and openness upon wage inequality[1] are contradictory with the HOS prediction that the skill premium should decrease in the South. The explanation of trade-induced inequality in the South has consequently

[1] e.g., Kang (2001) for Korea, Benjamin et al. (2008) for China, Dutta (2007) for India, Kucera. and Roncolato (2011) for India and South Africa, Hanson and Harrison (1999) for Mexico, Galiani and Sanguinetti (2003) for Argentina etc.

turned towards two main directions. Firstly, FDI from northern MNEs to southern countries entails technological transfers that can increase the demand for skilled workers in the South and thereby the skill premium. Secondly, MNEs tend to pay their working force more that the southern domestic firms, which can result in both within skill groups and between skill groups inequality.

Four types of mechanism have been put forward to reconcile the North-South trade explanation with observed facts. Firstly, the traditional North-South HOS (henceforth NS-HOS) model has been extended and some of its most simplifying assumptions released (Agell and Lundborg, 1995; Davis, 1998; Albert and Merckl, 2001; Kreickemeier and Nelson, 2006; Hellier and Chusseau, 2010; Hellier, 2012a and 2012b etc.). Secondly, the impact of foreign direct investment (FDI), multinational enterprises (MNEs) and international outsourcing has been both modelled and assessed, showing the weight of these channels in explaining inequality in both the North and the South. Thirdly, the impact of openness when firms are heterogeneous has been addressed in the so-called new-new (Melitz-type) theories of trade. Finally, globalization can act upon technological changes and institutions in a way that increases inequality. This article briefly describes these four strands of literature by emphasizing on both their mains mechanisms and their empirical relevance.

Section 2 exposes the main observed facts related to globalization and inequality over the last thirty years. Section 3 considers the traditional approaches to trade and assesses their explanatory power regarding these facts. Section 4 explores the explanation based on multinational firms, FDI and international outsourcing. Section 5 addresses the explanations given by the new theories based on firm heterogeneity and Section 6 the impacts of globalization upon technological change and institutions. We conclude in Section 7.

2. Stylised facts

Over the last thirty years, the World economy has experience both a rapid globalization dynamics and a significant increase in within-country inequality.

2.1. Within-country Inequality

Advanced countries

Figures 1 and 2 depict the variation in income inequality in different advanced countries as measured by the P90/P10 ratio of earnings (from the OECD) and the Gini coefficient of (post-

tax and transfer) incomes (from the Solt Database, 2010; presentation: Solt, 2009). Over the last thirty years, the increase in inequality is general, even if both its intensity and its periodicity critically differ across countries. Figure 3 shows that, particularly in certain Anglo-Saxon countries, the increase in inequality is to a large extent explained by the rise in the top incomes. Haskel et al. (2012) show that, from 1991 to 2010, there has been small differences in the variation of the real income between skill groups (between 0 and +10% in twenty years) whereas the top 1% incomes have grown by more than 50% over the period.

It can be underlined that, whatever the considered indicator (Gini, P90/P10, share of the top 1%), one can observe an increasing divergence in inequality between advanced economies over the last thirty years.

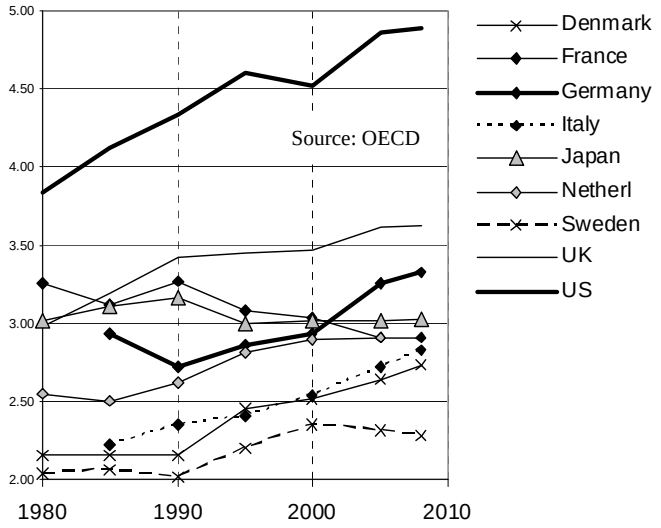


Figure 1: Ratio P90/P10 in 9 advanced countries, 1980-2008

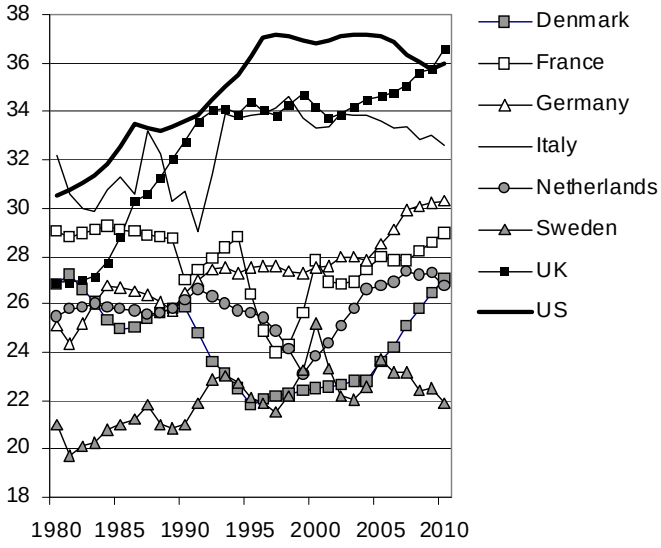


Figure 2: Gini of net incomes, 8 advanced countries, 1980-2010 (Solt Database)

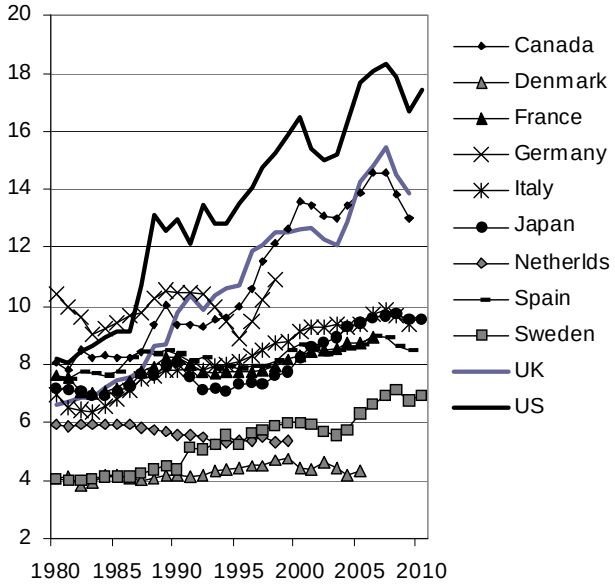


Figure 3: Top 1% Income Share (Source: World Top Income Database).

It must finally be noted that the most recent works on the United States show that, during the last decade, the dynamics of inequality displays new characteristics (Haskel et al., 2012). Firstly, the increase in real incomes is almost fully concentrated in the very top of income distribution (the top 1%). Second, both the low skills and very high skills do better than the medium skills that seem to be the mains losers in this period.

Emerging countries

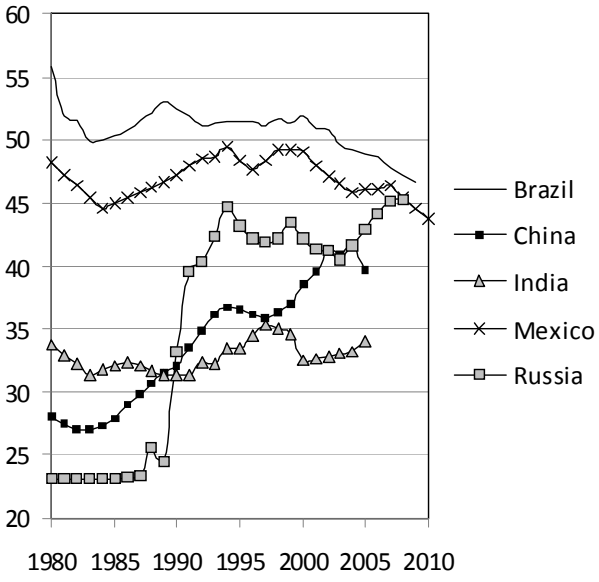


Figure 4: Gini of net incomes, major five emerging countries, 1980-2010 (Solt Database)

Figure 4 pictures inequality as measured by the Gini of incomes (from the Solt database) for the first five emerging economies (China, Brazil, Russia, India and Mexico) and Figure 5 (from Chusseau and Hellier, 2012) the inequality profiles of different developing areas over the thirty last years. It is clear that in emerging and developing countries the moves in inequality have been both diverse and sometimes ambiguous. Three major conclusions can be drawn from Figures 4 and 5. First, there has been on average an increase in inequality over the last thirty years. Second, the trends appear very diverse across countries and regions. Third, if the nineties have known a general increase in inequality, there could be a reversal in most regions in the 2000s. However, this possible reversal needs to be confirmed.

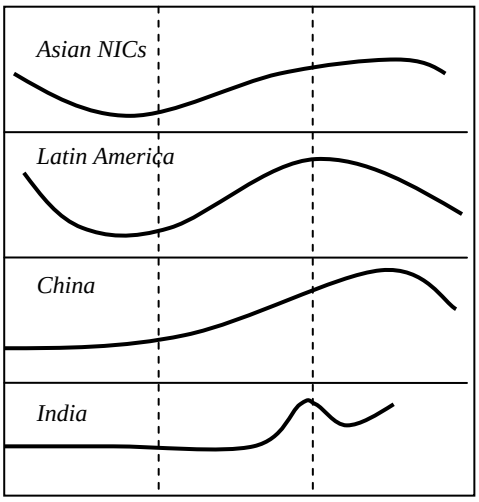


Figure 5: Profiles of income inequality over the last thirty years

Between-group vs within-group inequality

Several works use decomposition analyses to distinguish between within-skill group and between-skill group inequality (Bound and Johnson, 1992, Berman et al. 1994; Berman et al. 1998 etc.). From these calculations, it is clear that within-skill groups inequality has increased, and certain works even show that this increase is higher than the rise in between-group inequality. In addition, a number of studies show that within-group wage inequality has risen with trade liberalization (Attanasio et al., 2004; Menezes-Filho et al., 2008).

2.2. Globalization

Globalization encompasses several dimensions. Firstly, globalization is characterised (i) by growth rates quicker for trade than for production, and (ii) by a huge increase in the weight of emerging countries in both world trade and world production. Secondly, globalization has

come with both (ii) a substantial rise in Foreign Direct Investments (FDI) particularly (but not only) from the North to the South, and (ii) a considerable increase in financial flows following the capital liberalization in the 80s and 90s.

Trade

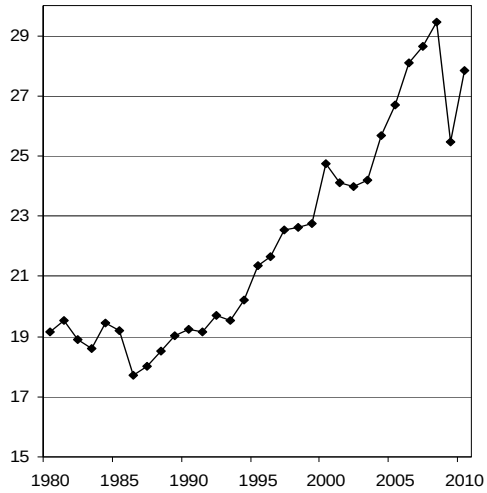


Figure 6: Ratio Exports/GDP at the world level (World Bank, World Development Indicators)

Figure 6 depicts the increase in the Exports/GDP ratio at the world level, and Figure 7 the share of the North and the South in world trade of manufacturing[2]. It is clear that (i) international trade has increased significantly more than production, and (ii) the weight of the South in trade, and particularly in trade of manufacturing, has known a critical upsurge.

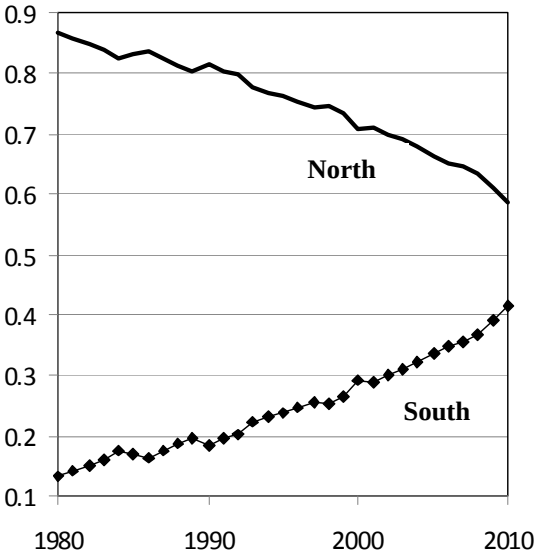


Figure 7: Shares in the World exports of manufacturing (%, CHELEM database)

[2] The North comprises Australia, Canada, Japan, New Zealand, the US and Western Europe. The South gathers other countries, except the former USSR and Central and Eastern Europe which are not accounted for.

FDI

Figure 8 depicts the ratio of FDI net inflows on GDP at the World level. It clearly demonstrates a huge increase in the nineties.

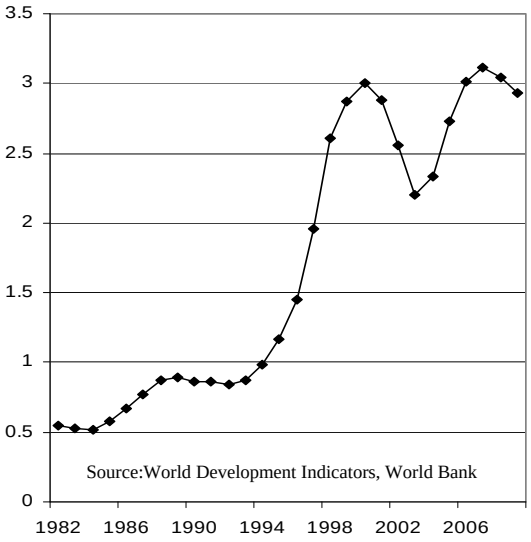
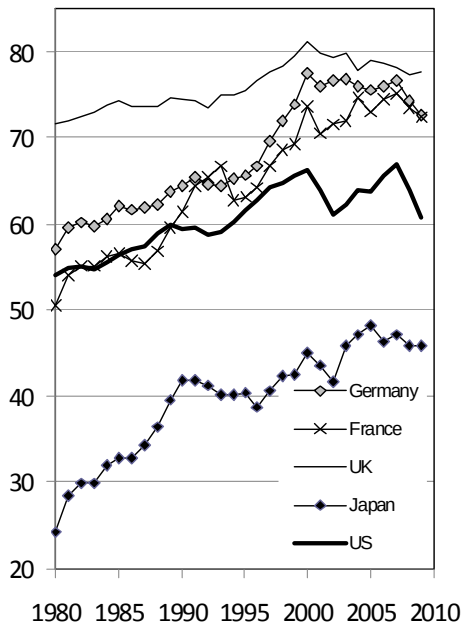


Figure 8: Net inflows of FDI/GDP (5 years moving average), World, 1980-2008

Globalization index



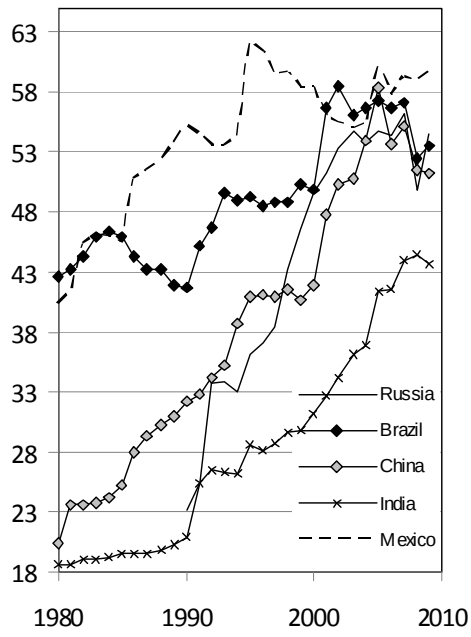


Figure 9: KOF Index, Advanced economies *Figure 10:* KOF Index, Emerging countries

Figures 9 and 10 describe the KOF index of economic globalization (http://globalization.kof.ethz.ch/, see Dreher, 2006, and Dreher et al., 2008) for the main five advanced economies (US, Japan, Germany, France and UK) and the main five emerging

countries (China, Brasil, Russia, India, Mexico). This index combines economic flows (trade, FDI, portfolio investment and income payments to foreign nationals) and indicators of restrictions (barriers, tariffs, taxes on international trade, capital account restrictions). All the countries display a substantial increase in their globalization index.

In summary, we can make the general diagnosis that the last thirty years have experienced a significant increase in within-country inequality in both advanced and emerging economies combined with a multidimensional globalization dynamics.

3. Traditional trade theories and extensions

We firstly expose the North-South HOS (NS-HOS) model and we underline its failures to adequately predict the main observed characteristics of the globalization-inequality nexus. We secondly show that most of these characteristics can be found by extending this model. Similarly, the standard Ricardian approach to trade is by construction inappropriate to address the issue, but combining this approach with the HOS framework makes it possible to reveal certain prominent facts observed since the early eighties. Finally, introducing unequally talented workers inside the HOS approach provides an explanation to the huge increase in top incomes.

3.1. The North-South HOS model

Let us assume a standard $2\times2\times2$ HOS model with skilled labour (*H*) and unskilled labour (*L*) being the two factors, the North and the South the two countries, the former (latter) being relatively better endowed with skilled (unskilled) labour. Denoting respectively w_H and w_L the unit wage of skilled and unskilled labour, the skill premium $w \equiv w_H / w_L$ measures inequality. Compared to autarky, this model predicts that free trade between the North and the South leads to:

1) A trade specialisation of the North in the skill-intensive good and of the South in the unskilled-intensive one.
2) An increase in inequality (the skill premium) in the North.
3) Both countries produce both goods (when being both inside the diversification cone).
4) A decrease in inequality in the South.
5) Factor price equalization at the world level.
6) Full employment of both factors in both countries.

7) A decrease (increase) in the skill intensity in both sectors in the North (the South).

8) An increase (decrease) in the relative price of the skill-intensive good in the North (the South).

From the above list, it is clear that most of the NS-HOS predictions are at odds with observed facts. Only the first two predictions and half of the last two (the increases in skill-intensities and the decrease in the relative price of skilled-intensive goods in the South) are correct. All other predictions are the exact opposite of what has been observed.

3.2. Extensions of the NS-HOS approach

The inadequacy of the standard NS-HOS approach to model the main characteristics of the globalization-inequality relationship derives to a large extent from its over-simplifying assumptions. Hellier (2012a, 2012b) has shown that extending this model by releasing certain assumptions allows revealing most of these characteristics.

The size of the South

Within the standard NS-HOS model with factor price equalization, the rise in the size of the South in relation to the North augments the skill premium (inequality) in all the northern and southern countries already involved in the globalized economy. This is simply because the South is better endowed with unskilled labour than the North.

The HOS model outside the diversification cone with a growing size of the South

By assuming large differences in skill endowments between the North and the South (what is effectively observed), both areas are not in the diversification cone and they thereby do not simultaneously produce both goods. In addition, by assuming that the size of the South increases, it is possible to distinguish three successive stages of globalization (Hellier, 2012a, 2012b) corresponding to the North being large and the South small (Stage 1), to both countries being medium-sized (Stage 2), and to a large South and a small North (Stage 3). Stage 1 is characterised by (i) the North producing both goods and the South good *l* only, (ii) a continuous increase in inequality (the skill premium) in the North and a decrease in the South, and (iii) a decrease in the real wage of unskilled workers in the North and an increase in the South. In addition, when assuming several northern countries, the first stage of globalization in characterised by a divergence in inequality between them (Hellier, 2012b). Stage 2 is characterised by each country producing one good only (*h* in the North and *l* in the South), by constant inequality in both areas, and by an increase in the purchasing power of

northern workers and a decrease of that of southern workers. Finally, the North produces good *h* only with constant inequality and the South both goods with increasing inequality in the third and last stage.

In addition, from a NS-HOS model with 3 countries (2 northern countries and the South), a continuum of goods and no factor price equalization, Hellier and Chusseau (2010) have shown that the growing size of the South (which corners new and more skill intensive goods) has different impact on the two northern countries depending on their initial inequality level. More precisely, the northern country which is initially inequality oriented suffers a far more painful adjustment than the egalitarian country. The former either undergoes a high intensity inequality unemployment trade-off, or must critically increase its skill endowment.

Labour market imperfections

Assuming 'imperfections' in the northern labour market makes it possible to generate (growing) unemployment in the North. These imperfections are many. Three of them have been particularly analysed: the setting of a minimum wage, efficiency wage behaviours and search and matching frictions.

By inserting into the HOS model a minimum wage in one northern country (Europe) and not in the other (the US), Davis (1998) shows that this minimum wage is 'adopted' by the US (through market adjustments), all of the so-created unemployment being located in Europe (the country that sets the minimum wage). In addition, by introducing emerging countries into the model, the derived increase in unemployment is once again fully located in the country which sets the minimum wage (Europe). The other country (the US) is thus insulated from the impact of the competition from emerging economies since (i) it benefits from the European minimum wage and (ii) it maintains full employment. A key limitation of Davis model is that it is at odds with the observed fact that inequality has critically increased in the US and not in Europe. From Davis' framework but assuming that the minimum wage setting country (Europe) is outside the diversification cone (thereby producing the skill-intensive good only), Oslington (2002) shows that Europe suffers high unemployment because of its minimum wage whereas inequality grows in the US because of the competition from emerging countries. This story is more convincing but it is still contradictory with the fact that the US specialization is more high tech and skill intensive than that of Europe. Finally note that a very simple way to create unemployment in the North from the NS-HOS model is to suppose that both the North and the South are not simultaneously inside the diversification cone and to assume that the North sets a minimum wage.

Efficiency wage behaviours provide another way to introduce imperfection in the labour market. Within a standard HOS model with labour and capital, inserting the fair wage hypothesis typically generates unemployment (Agell and Lundborg, 1995; Albert and Merckl, 2001). Kreickemeier and Nelson (2006) propose a North-North HOS model with a fair wage-driven effort for both skilled and unskilled workers, the model being subsequently extended by the introduction of an unskilled labour-abundant South. The reference wage is defined following Akerlof and Yellen (1990) as a combination of the wage of the other group and the wage workers expect to receive if they resign. The model generates unemployment and the authors focus on the intra-North disparities and interactions but not on the North-South differences. It is finally rather simple to generate unemployment within a North-South HOS model by assuming fair wage behaviours of firms in the North. In addition, if the reference wage in the effort function negatively depends on unemployment, the competition from the South can generate a dynamics that combines growing inequality and growing unemployment in the North (Hellier, 2012a), which is what has been observed in most advanced countries.

Search and matching also create labour market imperfections that generate unemployment within the HOS approach[3]. The main mechanism by which openness increases unemployment within an HOS framework with matching frictions is the following. North-South openness boosts production in the sector in which the country has a comparative advantage at the expense of production in the sectors with a comparative disadvantage. This shifts the production structure, which requires a move of workers from the falling to the rising sector. If matching between labour supply and labour demand is costly and time-spending, this generates unemployment.

Technological differences and transfers

Even if MNEs ensure technological mobility between the North and the South, full technological similarity is typically not reached because several barriers lower productivity and efficiency in the South (lack of infrastructures, skill mismatch, property right enforcement failures, etc.). The HOS assumption that both countries share the same technology can be relaxed in three ways (Hellier 2012a, 2012b): (i) by assuming a productivity gap between the South and the North, (ii) by assuming that this gap is lessened with time and (iii) by assuming that, before globalization, southern technologies were less skill-intensive than northern ones.

[3] e.g., Helpman & Itskhoki (2010) introduce search and matching into a model that combines comparative advantage and increasing returns to scale.

Within the HOS model, assuming that the total factor productivity (TFP) is lower in the South than in the North and that this productivity gap is similar in both sectors is equivalent to reducing the working population of the South, i.e. its size. This stems from constant return to scale. Thus, as the productivity of southern workers is smaller than that of northern workers, the former are less paid than the latter, but the skill premia are the same in both areas. In addition, if globalization causes the South productivity to catch up the North productivity, this is equivalent to an increase in the size of the South. This analysis provides an explanation for the limited weight of the South in world trade and production until the early nineties (as underlined by Krugman), and for the subsequent acceleration in this weight (Hellier, 2012b).

The NS-HOS model can also be extended by assuming that southern technologies were less skill-intensive than northern ones before openness (Pissarides, 1997). In this case, (i) the northern TFP must be sufficiently higher than the southern TFP to incite the South to adopt it[4], and (ii) when this condition is fulfilled, the adoption of the skill-intensive northern technology can increase inequality (the skill premium) in the North.

Finally, when assuming several southern countries with different skill endowments and different productivity gaps and technological discrepancies with the North, the so-extended NS-HOS model generates very diverse profiles across southern countries, which corresponds to the observed developments (Hellier, 2012b).

3.3. Combining the Ricardian and the HOS approaches

The standard Ricardian model is clearly not tailored to address the issue of trade-induced within-country inequality. This is because (i) it comprises one factor of production only (labour) and, (ii) unlike the HOS neoclassical approach, the distribution of income between wages and profit is not a purely technical issue the determinants of which are modified by the countries' specialization[5].

However, one can analyse the effect upon inequality of combining the Ricardian hypothesis of differences in the relative productivities with the Heckscher-Ohlinian hypothesis of differences in factor endowments. Inside the NS-HOS framework, this consists in assuming that the ratio of the TFP in the skill intensive sector on the TFP in the unskilled-intensive one differs between countries. A rather realistic position is to assume that the North

[4] Skill-intensive technologies are typically more costly than unskilled-intensive ones in the South because of its high endowment of unskilled labour.

[5] Note that, if globalization impacts on income distribution through changes in labour market institutions, then globalization may generate inequality within a standard Ricardian approach.

is (i) more productive than the South in both sectors and (ii) relatively more productive than the South in the skill-intensive sector. Within a simple model with Cobb-Douglas technologies, it is easy to show that these assumptions induce both no factor price equalisation and a skill premium higher in the South than in the North, which is in line with observed facts.

3.4. HOS and the 'superstars'

The share of top incomes (top 10%, 1%, 0.1% and 0.01%) in total income has critically risen in the last two decades. Explaining the huge increase in top incomes has thus become a challenge for economists. Haskel et al. (2012) propose an extended HOS approach in which workers differ in talent, with talent increasing productivity in the capital-intensive sector but not in the labour-intensive one (the authors speak of 'talent-capital complementarity'). Here capital must not be understood as physical capital but rather as immaterial assets (intellectual and intangible capital, reputation, complex services and technologies etc.). There are three groups of workers. The most talented only work in the capital intensive sector, the low talented work in the labour-intensive industry only, and the medium talented work in both sectors. If there is an increase in the demand to, or a technological progress in the capital-intensive sector only, this favours the most talented workers at the expense of the medium and least talented. This is because, unlike the most talented workers who work in the capital intensive sector only, the medium talented will move from the labour-intensive to the capital-intensive sector causing thereby their wage to decrease.

In this approach, globalization is defined as "any change that raises profits in the capital-intensive sector at current product prices, factor prices, and technology" (Haskel et al., 2012, p.133), which involves trade liberalization but also very diverse additional changes. Considering the aforementioned mechanism, globalization increases the income gap between the most talented (the 'superstar') and the rest of the population (the medium and the least talented).

Finally, a number of models show that the most talented or able individuals (the 'superstars') catch most of the increase in income[6]. In a recent article, Bonfatti and Ghatak (2013) propose an explanation for the increase in the skill premium in developing countries based on unequally talented workers. Their model combines trade between a skill-abundant North and an unskilled-abundant South with education and imperfect access to credit. In the

[6] Rosen (1981), Grossman and Maggi (2000), Manasse and Turrini (2001), Grossman (2004) and Blanchard and Willmann (2011).

South, trade reduces both the return to skill (as in the HOS approach) and the cost of subsistence. The first reduction moves the least talented children from skilled families out of the skilled labour force, whereas the second allows the most talented children from low skilled families to go to school. The derived concentration of talented workers in the skilled labour force offsets the decrease in the return to skill and raises the apparent skill premium.

4. MNEs, FDI and Offshoring

A key characteristic of the globalization process is the huge increase in FDI from MNEs, and a key element of these FDIs is international outsourcing (or: offshoring). Multinational firms locate the different stages (segments) of their production in different countries according to the related production costs. This results in an increase in the share of intermediate goods in total trade (Yi, 2003). The traditional approaches to international trade cannot account for this because they do not integrate segmentation of production in their assumptions (in these approaches, one unit of good is always fully produced in one country). By inserting segmentation into the NS-HOS model, it is possible to show that, despite the increase in the northern skill premium, North-South openness can come with an increase in the skill intensities in all sectors in the North provided that the skill supply augments in this area (Hellier, 2012a). In addition, an important contribution of FDI and offshoring for the understanding of growing inequality concerns emerging countries. It goes through four main channels, namely, capital transfers, capital-skill complementarity, technological transfers and the MNEs' wage setting.

4.1. Offshoring

Segmentation describes the usual situation in which production can be divided into several tasks, each of which can be implemented by different plants in different places. When these segments are located in different countries, one speaks of *international outsourcing* or *offshoring*, both terms being synonymous.

At the international level, offshoring is carried out by firms because the segments differ in their factor intensities and technologies and because the countries differ in their factor endowments and technological abilities. Firms will then locate the different production stages in the countries where there is a cost advantage.

A now abundant empirical literature has shown that offshoring has had a negative impact upon the labour market position of low-skilled workers in both the North and the South:

Anderton and Brenton (1999) and Hijzen et al. (2005) for the UK; Feenstra and Hanson, (1996b, 2001) and Ebenstein et al. (2009) for the US; Anderton et al. (2002) for Sweden; Egger and Egger (2003) for Austria; Strauss-Kahn (2003) for France; Antonietti and Antonioli (2011) for Italy; Hsieh and Woo (2005) for Hong Kong after China's reforms.

Several works have also found that offshoring had a positive impact upon wage inequality (Crinò, 2009, for a review). Most studies suggest that the impact on wage inequality of material offshoring (relocation of production activities) during the 1980s and 1990s was of a similar magnitude as the impact of SBTC. For Germany, Becker et al. (2009) revealed that offshoring shifted labour demand in favour of high-skilled workers and appears to explain only up to 15% of changes in wage bill shares over the period 1998-2006. For Mexico, Feenstra & Hanson (1997) showed that the American 'maquiladoras' sparked off a significant increase in the demand for skilled workers in the border region with the US. For Brazil, Fajnzylber and Fernandes (2004) showed that the use of imported inputs and FDI is linked to greater demand for skilled workers. In the case of China, Chen at al. (2011) showed that FDI increased between-firm wage inequality.

4.2. Offshoring and capital transfers

Within a model in which the production of one good combines different intermediate tasks of different skill intensity, Feenstra and Hanson (1996a) analyse the impact upon inequality of an increase in the capital stock in the South. Intermediate tasks utilise skilled labour, unskilled labour (with different skill intensities) and capital (the relative use of which is identical for all tasks). For a given capital stock in the unskilled labour abundant South, there is a threshold value of skill intensity such that all intermediate tasks below this threshold are located in the South and all those above in the North. If the capital stock increases in the South, e.g. because of lower exporting cost for capital goods and capital transfers from the North, then the range of intermediate tasks performed by the South increases, i.e., the skill intensity threshold increases. This causes inequality (the skill premium) to increase in both the North and the South.

4.3. Openness and capital-Skill complementarity

Consider an economy in which production utilises unskilled labour L, skilled labour H and capital K. Further assume capital-skill complementarity (CSC). In its strong acceptation, CSC means that an increase in capital utilisation induces higher demand for skilled labour. In it

weak acceptation, CSC is defined by the situation in which capital is more substitutable for unskilled that for skilled labour. In both cases, an increase in capital utilisation entails an increase in the relative demand for skill H^d / L^d, and thus an increase in the skill premium, i.e. inequality.

Technologies being given, an increase in capital utilisation typically results from a decrease in its cost. Now, there are several channels through which North-South openness can lower the cost of capital $(1+r)p_K$.[7] This is firstly the case when openness increases the amount of savings available for investment, which lowers the interest rate *r*. Note that, if openness increases inequality (by other mechanisms) and if the rich have a higher marginal rate of savings than the poor (Kaldor, 1955-56; Stiglitz, 1969; Bourguignon, 1981), then openness raises savings. A second channel is when offshoring to the South of unskilled intensive stages of production reduces the cost of producing capital goods (as for computers and telecom goods). The third channel is when capital goods produced with northern technologies and imported by the South are costless that those produced in the South. The last two channels are linked to offshoring. The last increases the use of capital and thereby the skill premium and inequality in the South whereas the one before the last does it in the North.

4.4. Offshoring and technological transfers

Offshoring by MNEs typically comes with technological transfers from the North to the South. Pissarides (1997) pointed out that these transfers can increase the demand for skill and hence the skill premium in the South through two channels. Firstly, the adoption of new technologies requires a transitory use of skilled workers to adapt the firm's manpower and organisation. Secondly, if the technologies imported from the North are more skill intensive than those previously utilised in the South, the demand for skill rises.

4.5. The MNEs' wage setting

Several empirical works have underlined that, in emerging countries, MNEs pay their workers more than domestic firms (Bernard and Jensen, 1995, 1997; Frias and Kaplan, 2009). This can firstly be explained by a higher productivity of the former. However, higher productivity explains why MNEs can pay more but not why they do pay more. A convincing explanation for this is that they want to prevent the turnover of their workforce. In fact, MNEs make a

[7] r is the interest rate and p_K the price of capital goods.

costly training effort to adapt their workforce to new technologies and new internal organisation. They are thus incited to offer higher pay to prevent their workers to move to other firms. In addition, as training expenses are higher for skilled than for unskilled workers, the related wage premium is higher for the former. This can thus explain both within-skill group rising inequality (between MNEs and domestic firms) and between-skill group rising inequality (inside the MNEs).

5. Globalization and inequality in the new-new trade approaches

A now well documented specificity of exporting firms compared to non exporting firms is that they are larger and more productive, utilise workers with higher skill and provide their employees with higher pay (Bernard and Jensen, 1995, 1997; Bernard et al., 2007; Frias and Kaplan, 2009). This has been observed in both developed and developing countries. From a Dixit-Stiglitz type model in which firms are heterogeneous in productivity, Melitz (2003) showed that only the most productive firms can export. Several models have subsequently extended Melitz approach by assuming labour market imperfections. This typically results in uneven pay according to the firms, with an exporting wage premium.

5.1. Melitz model

Melitz (2003) assumes differences in productivity between firms within a Dixit-Stiglitz monopolistic competition framework with a production function that utilises labour only (*à la* Krugman, 1980). This creates rents for the most productive firms. More precisely, in autarky there is a cut-off productivity level λ_A (corresponding to zero profit) such that all the firms below this level do not produce, and all those above produce and have a positive profit (Figure 11). The higher the productivity, the higher the profit (Figure 11-b). Trade liberalization allows the firms to export, but there is an extra exporting cost to be paid. Consequently, only the most productive firms can pay this cost and export. In the domestic country, openness thus results in the following major changes:

1) As a fraction of the domestic market is now provided for by foreign firms (via imports), the least productive domestic firms cease to produce and leave the market. The domestic firms' cut-off productivity level for producing thereby moves from λ_A up to λ_O (Figure 11).

2) There is now a cut-off productivity level for exporting λ_E that is higher than the cut-off level for producing because of the extra cost. Hence, there are two types of domestic firms.

These with the lowest productivity (situated between λ_O and λ_E) only produce for the domestic market and have relatively low production, revenue and profit. Those with high productivity (above λ_E) produce for both the domestic and the foreign market and display high production, revenue and profits. At the cut-off productivity for exporting, there is an upward jump in production and in the slope of the profit curve (Figure 11).

3) Finally, there is productivity level $\overline{\lambda} > \lambda_E$ such that all firms with productivity above $\overline{\lambda}$ have higher profits in openness than in autarky.

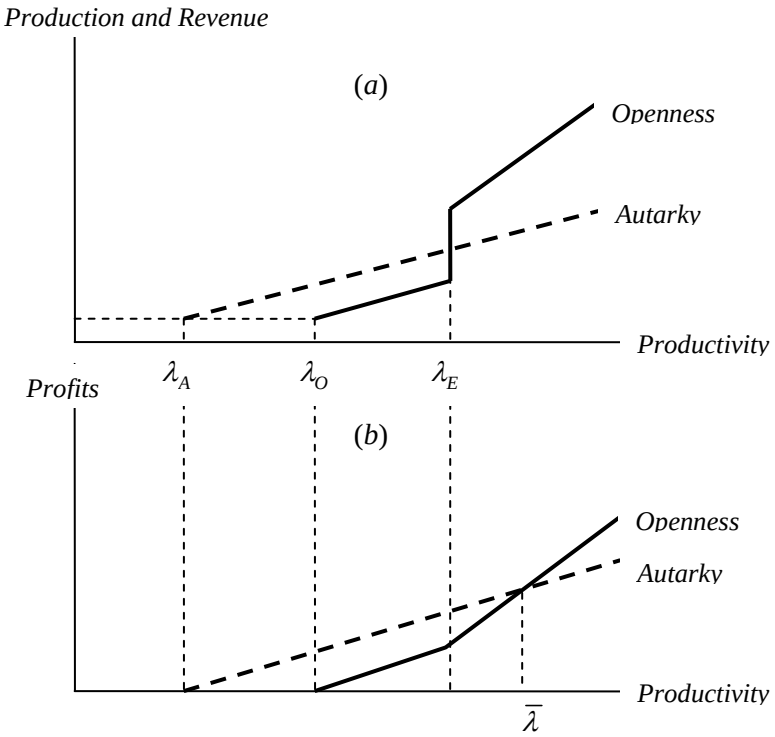


Figure 11: Production, Revenue and Profit in Melitz model.

5.2. Inequality and the interplay between openness and institutions

In Melitz model, firms exhibit different profit levels according to their productivity. In addition, openness divides the production system between domestic-oriented and exporting firms, the latter being both more productive and more profitable. There is thus room for different income distribution patterns, and openness may modify these patterns.

The emergence of productivity-related rents opens the question of their distribution. If production requires labour only and if there is no specific management staff that can appropriate rents, then the model results in between-firm differences in wages. If the model is transformed by assuming other factors of production, and if these are paid at their marginal

productivity, then the marginal productivity of both factors is higher in the highly productive firms (with higher total factor productivity, TFP) than in the low productive ones. Here again, this generates within-group inequality. If the two factors are skilled and unskilled labour, then openness results in intra-skill inequality for both low and high skilled workers. When the divergence in productivity derives from differences in managerial abilities, managers may find an interest in sharing the related rents with their workers. This is firstly the case when workers have intra-firm fair wage behaviours (Egger and Kreickemeier, 2012; Amiti and Davis, 2011). The divergence in productivity thereby creates inter-group (between managers and between workers) inequality and inequality between workers (intra-group) is also fostered by the fair wage-induced unemployment (Egger and Kreickemeier, 2012). The same type of distribution story can emerge when the level of wages is bargained between a worker union and the firm.

In addition, openness and trade typically modify the inequalities that derive from the differences in productivity. This can be easily seen from the moves in profits as depicted in Figure 11-b. Trade increases the profit of the most productive firms (those with a productivity higher than $\bar{\lambda}$) at the expense of the least productive ones. In Egger and Kreickemeier (2012) approach, this causes a multidimensional rise in inequality: more unemployment, higher inequality between managers and employees and higher within-group inequality. In addition to the fair wage hypothesis and firm heterogeneity *à la* Melitz, Amiti and Davis (2011) assume (i) that the final goods are produced from the combination of intermediate goods, and (ii) new heterogeneities, namely, different trade costs in both exports and imports across firms. From this framework, they analyse the impact of tariff cuts in the final and in the intermediate goods and the resulting moves in wages. These changes are diverse. A drop in output tariffs increases the wage of workers in exporting firms and lowers that of workers in non-exporting firms. A cut in input tariffs increases the wage of workers in firms which import inputs and decreases the wage of workers in the firms that are not input-importers.

Efficiency wage is not the only labour market imperfection that can be coupled with firm heterogeneity to analyse the effects of openness upon inequality. Helpman et al. (2010) have combined Melitz approach with (i) search and matching frictions (*à la* Diamond–Mortensen–Pissarides) and (ii) unobservable differences in workers' ability. This model exhibits two key results as regards inequality. First, the passage from a closed to an open economy increases inequality. Second, once the economy is open, increasing openness firstly raises and subsequently lessens inequality. In other words: there is a threshold openness level below which more openness increases inequality and above which it decreases inequality. The

reasons for theses findings are as follows. Within a Melitz model, exporting firms are larger and more profitable. They can thus spend more money for screening and thereby attract the most able workers who are also better paid. This increases inequality. Figure 12 provides the rationale for the second finding. The thin unbroken line represents the distribution of profits among firms according to their productivity in autarky. The bold unbroken line depicts the same distribution for the country being fully open, i.e., all its firms are exporters. The dashed line depicts the situation in which only part of the firms are exporters (those with productivity above λ_E). If the distribution of profits (and finally the distribution of income) is more egalitarian in autarky than in openness, inequality is lower in full openness than in openness. This generates an 'openness Kuznets curve'.

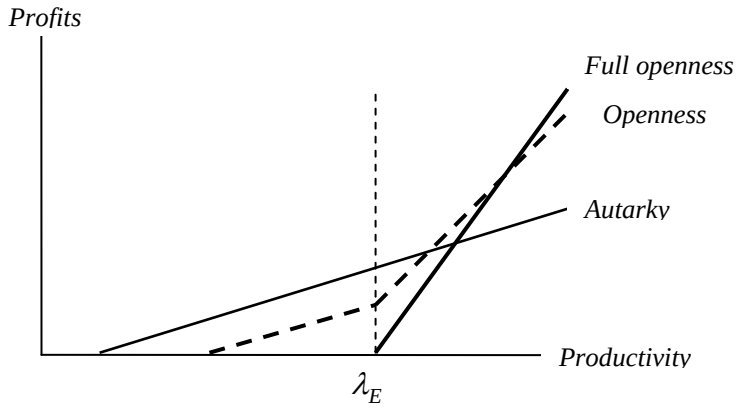


Figure 12: Profit distribution according to openness

6. The impact of globalization on technical change and institutions

In addition to globalization, changes in technologies and institutions are the two main explanations that have been given to rising inequality over the last thirty years. When globalization has an influence upon technological change and institutions, these modifications can in turn impact upon inequality. We now report certain of these indirect effects[8].

6.1. Globalization-induced technological bias

We have already exposed the impacts of trade of capital goods and offshoring upon technological transfers from the North to the South, and thereby on growing inequality in the

[8] In contrast, we do not report the influences of technological change and/or institutions on globalization and their impacts on inequality (see Chusseau and Dumont, 2012).

latter. We now describe the cases in which openness encourages skill biased technological change (SBTC).

SBTC refers to situations in which technological change causes an increase in the relative demand for skilled labour H^d / L^d. For given factor endowments $\bar{H}$ and $\bar{L}$, this raises the skill premium, i.e. inequality.

Following Wood (1994) who put forward the idea that competition from southern countries could incite northern firms to invest in SBTC, Acemoglu (1998) and Thoenig and Verdier (2003) provided a robust explanation for this behaviour. When property rights on technology are poorly enforced in the South, northern firms are incited to orientate R&D towards skill-intensive technologies for which the South suffers a disadvantage due to its low endowment of skilled labour. Then, North South openness-driven SBTC results in growing inequality.

In addition, if North-South trade induces an increase in the price of skill intensive goods in relation to unskilled intensive ones, this can foster R&D in the former sectors, which causes higher demand for skilled labour and an increase in the skill premium (Acemoglu, 2003).

Finally note that the impact of trade on R&D and technological change is supported by several empirical works (e.g., Bloom et al., 2011).

6.2. Globalization-induced changes in institutions

In sections 3 to 5, we have underlined the impact on inequality of the combination of globalization on the one hand, and institutions or/and imperfections in the labour market on the other hand. On top of these interactions, there are numbers of mechanisms by which globalization tends to modify institutions in an anti-egalitarian way.

An old and abundantly analysed mechanism is tax competition (Zodrow and Mierzkowski, 1986; Wildasin, 1988; Bucovetsky and Wilson, 1991; Kanbur and Keen, 1991; Wilson, 1999 etc.). Globalization being characterised by high capital mobility, this results in a ‘race to the bottom’ as regards corporate tax. As corporate tax lessens profits that typically go to the rich and their cut lessens the funding for social redistribution to the poor, tax competition increases after tax and redistribution inequality. More generally, tax competition occurs when tax bases are internationally mobile. The fact is that mobile bases essentially concern the rich. On top of capital, there is substantial mobility of highly skilled workers, of top executives and of highly talented persons (artists, sportsmen etc.). All these are rich taxpayers and lowering their levies increases inequality (the fact that tax rates decrease at the

top of income distribution is now well documented for most advanced countries). In fact, globalization favours the exile of tax bases and encourages thereby tax breaks for two direct reasons which can be simply modelled as follows. Assume two countries, Home and Foreign (foreign values are depicted by an asterisk), with the respective tax rates τ and $\tau*$, and consider the (home) tax base b_i (this can be earnings, capital income, capital, wealth etc.). Let *c* be the cost of moving the base to the foreign country. Then, the base b_i moves if $\tau > \tau*$ and $b_i > \hat{b} = \frac{c}{\tau - \tau*}$. Only the rich taxpayers (with bases higher than $\hat{b}$) move abroad. Globalization fosters these moves for two reasons, namely, (i) by lowering the exit cost *c* and (ii) by increasing inequality through the mechanisms already described, which makes the amount of bases above $\hat{b}$ to increase.

Another possible channel can derive from the pro-competition impact of globalization when markets are imperfectly competitive. Then, globalization may increase the price elasticity of demand met by firms, which diminishes the wage claim from worker unions (Rodrik, 1997). The same result can derive from the globalization-driven increase in the wage elasticity of labour demand (see the survey by Rayp, 2012). The menace of production offshoring can also jeopardize the bargaining power of workers. Finally, most of the empirical works support the diagnosis that globalization tends to reduce the power of worker unions (Rayp, 2012; Dumont et al., 2012).

7. Conclusion

Starting from the diagnosis that the initial North-South HOS model is to a large extent inadequate to account for the globalization-inequality relationship, we have explored several ways to analyse the impact of globalization upon inequality:

1) Extending the NS-HOS model by relaxing certain simplifying assumptions makes it possible to generate most of the observed developments regarding the changes in between-skill inequality. The talent-augmented HOS approach also provides bases to model the huge increase in top incomes.

2) Segmentation, capital mobility and offshoring provide explanations for FDI and technological transfers that impact on both intra-skill group and inter-skill group inequalities, particularly in developing countries.

3) Firm (and worker) heterogeneity provide several mechanisms through which openness increases within-skill group inequality.

4) When globalization fosters skill biased technological change, this augments the skill premium.

5) Tax competition reduces redistribution and competition-enhancing globalization can reduce the unions' claims for higher wages and lessen unions' power through credible offshoring menaces

We thus possess a large range of possible mechanisms and explanations for the impacts of globalization upon inequality. It must be underlined that, in most mechanisms, globalization is combined with technological change or/and institutions. This shows that the initial goal to find the culprit among the three usual suspects (globalization, technical change and institutions) or to determine the weight of each in the explanation of growing inequality was to a large extent misleading. In most cases, it is the combination of these three determinants which generates higher inequality. In a large number of mechanisms, globalisation has a crucial contribution.

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